CHAPTER 1

INTRODUCTION

Observational Systems, Inc. provides the researcher with a complete package to facilitate the collection and analysis of observational data. The two parts of the package are the MORE data collection unit and a software package (ODAP) for editing, manipulating, and summarizing the data on a host computer.

MORE

The MORE is a portable solidstate device capable of storing 9600 characters of data. The MORE operates in the following four modes which allow the researcher to select the coding methods most appropriate to the research question. The recording mode is selected by simple key stroke at the start of a trial.

TIMED EVENT MODE. The observer enters events as they occur and the MORE automatically clocks and stores each event in sequence with its duration.

EPOCH MODE. The observer chooses an epoch size (1-99 time units). The MORE clocks a continuous sequence of epochs and stores in memory the data entered in each epoch. The observer is alerted to the end of each epoch by a display change and a click. This mode of recording is used for point sampling, modified frequency or zero-one coding, and coding simultaneous events.

EXTENDED EPOCH MODE. Similar to EPOCH MODE except there are two indepentently set clock phases per epoch.

CLOCK DISABLED MODE. The MORE provides no time base; it merely records the sequence of data keys pressed. The left display shows the last 4 keys pressed, while the right display shows the number of characters entered in the current line. Spaces and carriage returns may also be entered.

The most frequent uses of this mode are 1) recording from video tape when the time base is taken from the tape and manually entered along with each event, and 2) to use the MORE as a portable "keypunch" to enter any numeric data.

ELAPSED CLOCK MODE. Similar to timed event mode except the clock is not reset at the start of each event. The elapsed time from the start of the trial is shown on the display and stored in memory with each event. This is useful as a marker for field notes and editing.

EXTERNAL TIMEBASE MODE. Used when coding from video or audio tape. The MORE will write a time base on an audio track of the tape while the session is being recorded (or this can be dubbed on prerecorded tapes). The MORE when connected to the time base track will automatically recover the time as the coder keys in the event code. The time base is an intergral part of the tape which allows the tape to be stopped and repositioned during coding with the event times still being correct. Multiple passes can be made through the tape with confidence that the times will mesh exactly.

LATCH SWITCH . The MORE is equiped with 8 latch switches which faciliate the use of coding schemes which are not mutually exclusive. The latch switches allow you to use the MORE as an eight channel digital event recorder. When a behavior of interest starts, the corresponding latch switch is turned on and left on for the duration of the behavior. The switches can be turned on and off in any order and any number of switches can be on simultaineously. All information regarding sequence, duration, and simultaneity is stored in the MORE's memory. The latch switches and the standard keyboard (keys 0-9) can be used together in hybrid coding schemes in either timed event, elapsed clock, or epoch mode.

Data can be transmitted directly to the host computer through a standard terminal (RS232) or can be stored on an audio cassette tape for later reloading into the MORE and transmission to the host. The audio cassette I/O is reliable and includes file naming and searching, and verification routines.

ODAP

The host computer software package, ODAP (Observational Data Analysis Package), is a series of programs written in FORTRAN. They have been adapted to several computer systems (including minis) with relative ease. An overview of each program will be presented here. The ODAP manual describes each program in detail.

ODIN. Controls transmission of data from the MORE to the host computer. Performs error checks on each trial's header information and adds subject attributes (e.g. sex, age, group) to the header. ODIN reformats the data into an easily readable and workable sequential file which serves as the raw data for subsequent programs.

ODALL. Displays the frequency, duration, mean and standard deviation of duration, and the proportion of total frequency and total duration for each code occuring in a trial or group of trials.

ODNEW. Creates new event codes by combining codes in the raw data as dictated by user supplied definitions. For example, raw data codes 213, 313, and 423 all belong to the new category "PLAY". Summary statistics of these collapsed codes are output and serve as the dependent vaiables in subsequent analyses. An optional sequential file of the new codes can also be generated.

ODBLK. Blocks trial according to variables in trial headers for statistical analysis (e.g. group(4) by sex(2) ANOVA on each behavior of interest). Combines trials to produce one value for each dependent variable per subject per cell.

ODLAG. Produces lag sequential summary tables from data collected in timed event, epoch, and concurrent event modes. Lag 0 provides statistics on simultaneity, lag 1 provides standard Markov transition probabilities, and subsequent lags provide conditional probabilities of each event following the criterion at that lag ignoring intervening events.

ODCMB. Combines pairs of trials which have common start times into a single trial with codes equal the concatenation of the codes in the two trials. Used for for unifying the data in situations when multiple observers code different aspects of the same situation (i.e. one obsever codes caregiver behavior while another codes infant behavior).

ODXTB. Divides each code, according to user specifications, into a column value and a row value. A 2 x 2 table is output showing the total duration of each combination of row and column values.

ODKAP. Displays agreements and disagreements of two observers in a 2-way table and calculates Kappa and percent agreement statistics.

ODCOR. Outputs the correlation between frequency distributions of two coders. Used as a measure of reliability for frequency only codes.

The final step in the analysis is to read the data into an analysis package such as SPSS or BMD and perform selected analysis. The files output by programs ODBLK, ODNEW, and ODLAG can be read directly into the statistical package.

The general analysis scheme is to generate measurements of the dependent variable from the data portion of the trial (ODNEW, ODLAG) and analyze them by the levels of independent variables recorded in the header of each trial (ODBLK). The header plays a critical role in identifying each block of data and facilitating statistical analysis. Program ODIN allows easy editing and manipulation of trial headers including automatic addition of subject attributes which are the most common independent variables.

CHAPTER 3

SAMPLE SESSION WITH MORE

The MORE provides several options which allow the researcher to select the coding scheme most suited to the research question. Several features have been added to simplify operation. First, with the RED key up all data altering functions are disabled. This protected mode must be used during all data collection to reduce the chances of accidental data loss. Secondly, each major operation is initiated with a single keystroke (i.e. 'DUMP', 'LOAD', 'CODE'). Finally, when an option is available, the MORE prompts the user for a response with a mnemonic prompt in the left display.

The entire operation of the MORE can be divided into three parts: 1) entering data, 2) editing and verifying data, and 3) transferring data to and from a standard audio cassette or host computer. These operations are detailed in the following three chapters.

The following sample session on entering header and data demonstrates that each specific task is easy to set up and code. The new user is encouraged to follow the sequence of keystrokes through on a MORE.

In the example the coder selects Timed Event mode with a 3 digit code length and a 1 minute session timer. Two trials are coded. The first trial is started by entering a complete header starting with 'CODE', the three required fields (CS, CL, SC), and some optional information (date, coder, subject). The second trial is started by entering only the new subject id (77) into the header. Program ODIN will bring down the entire preceding header, overlaying the old subject id with the new one.

Sample Session with MORE.

Turn on power in battery pack.

Display	Key	Discription
	RESET	Enter the MORE system
	RED down	ENable data alteration
	CLEAR	Clear all pointers and write the 4 digit MORE id into the beginning of memory.
	RED up	Data PRotect mode, jumps to the end of memory and displays the last 4 characters entered which after a 'CLEAR' is the MORE id (5906 in this example).
5906	CODE	Create trial
CSCS	00'ADV'	Coding Scheme = timed event (00)
C1C1	03'ADV'	Code Length = 3 digits(03)
SCSC	01'ADV'	Session Clock = 1 min(01)
0000	100178'ADV	Date Enter optional header information
178A	02'ADV'	Coder Any number of fields may be entered
A02A	55'ADV'	Subject as long as the total header is less than 72 characters. Header fields are separated by 'ADV's and may vary in length.
	'DATA'	Start data portion of trial With the latch switch option all switches must be turned off before a trial can be started. 'EEEE's will show if any switches are on when 'DATA' is pressed. Turn them off, the screen will blank and you continue.
blank	123	1st event is 123. Duration in secs is shown on right display.
123	4	Start of 2nd event. Clock is stored along with 1st event and reset.
4	56	2nd code is 456
456	789	3rd event is 789
789		Wait until 1 minute has passed from when you pressed the 1st digit after 'DATA'. The three dots above 'SC' will come on and start flashing indicating the clock (SCSC) set above has timed out. The normal response is to wait until the current event (789) ends and then press 'FINISH' thus not censoring the duration of the last event.
789	'FINISH'	Finish the trial and display the number of usable character positions remaining in memory.
nnnn	77'ADV'	Overlay last 3 characters of previous header with 77A and keep the rest of the header the same. We are now ready to start a new trial with subject 77.
77A	'DATA'	Start data portion of 2nd trial

blank	111	1st event is 111
111	222	2nd event is 222
	.	
	.	
	999	last event is 999
999	'FINISH'	Finish 2nd trial. You may finish a trial before the Session Clock times out

CHAPTER 4

ENTERING DATA

POWER ON. To start, turn on the power and perform a RESET-CLEAR (RED down, 'RESET', 'CLEAR', RED up). This sequence drops the MORE ID into the start of memory and displays it on the left display. The 1st 2 characters of the MORE ID are the firmware version number, the last 2 characters are that MORE's index number. The MORE ID is transferred with the data in dumps to both the host computer and cassette tape, thus the MORE and firmware version the data were collected on is always available.

TRIAL HEADER INFORMATION.

Create a new session by pressing the 'CODE' key. This causes the MORE to position itself to add new data after the end of the last trial and provides prompts for the first three mandatory header fields. Prompts and responses are listed for the mandatory fields.

Mnemonic Prompt	Meaning	Response	Explanation
CSCS	Coding Scheme	00	Timed event mode.
		nn	Epoch mode. nn=01-99= number of secs/epoch.
		EE	Extended Epoch mode.
		EC	Elapsed Clock mode.
		Cd	Clock Disabled mode.
		Eb	Extended time Base mode.
C1C1	Code Length	00	Manual enter mode using 'BREAK'.
		nn	Fixed length number of digits per code.
SCSC	Session Clock	00	No session timer.
		nn	Number of minutes until trial times out and SC

display flashes.

When given the prompt, the coder should key in the desired response. This will be shown in the right display. If an error is made merely key in the correct response and when it is shown in the right display enter it by pressing the 'ADV' and the MORE will ADVance to the next prompt. If an incorrect response to a prompt is entered with 'ADV', press 'RESET' to terminate the header and 'CODE' to start a new one. After completing the first three fixed fields, key in whatever additional header information is desired such as subject, coder, and date, again separating fields with 'ADV's. These optional fields will be rolled across the left display as they are entered with the last four characters entered always remaining on the display. Pressing 'ERROR' in the optional portion of the header causes program ODIN to delete back to the previous 'ADV' or if 'ERROR' immediatly follows an 'ADV', the entire preceding field will be deleted.

Analysis of observational data with the ODAP programs is greatly facilitated if each header contains all the information needed to classify its associated data for analysis. For a Group by Age by Sex analysis, those three variables should be in a constant position in each header and have been carefully verified for correctness.

Many of the independent variables studied are subject attributes. A few examples are sex, group, and age. Program ODIN can copy such attributes into the header from a subject reference file on the host computer. Header expansion includes a date subtraction routine which calculates the number of days between a reference file date and the header date. Thus subject attributes and variables such as age or time on treatment can automatically be added to the header at the time the data are transmitted to the host computer, rather than having to key them in at observation time.

It is often advantageous to break up one coding session into several trials. For example, in studying the behavior of hospitalized children one might be interested in the effect of people in the room during particular treatments on the child's coping behaviors. Here "people present" and "treatment situation" are best considered header variables even though they could change several times during a coding session. Program ODIN allows this to be done by placing these variables at the end of the header, pressing 'FINISH' when one changes, then entering the new value of the field that changed (and reentering any fields to the right of it) followed by 'DATA' and the

continuation of behavior coding. The last N characters of the preceding header are overlayed by the N characters between the 'FINISH' and 'DATA'. This feature is also helpful when using a focal subject method of coding group behavior. Here, after keying in the entire pretrial for the first subject (with the subject id as the last field), only the new focal subject id needs to be keyed in on successive trials. The details of these functions are presented in the chapter on program ODIN. Only the characters representing the actual keys pressed are stored in the MORE, program ODIN does the expanding and overlaying of the header.

DATA.

When the header is complete, press 'DATA' to start data collection portion of the trial. The display goes blank until the first data character is pressed, at which time the session and event or epoch clocks start. All latch switches must be off at the start of a trial. If any switches are on when 'DATA' is pressed the display will show 'EEEE' and the MORE will not accecpt data. Turn the switches off, the display will go blank, and you may continue. For manual behavior entry press 'BREAK' after entering each complete event code. A 'BREAK' is automatically dropped every C1C1 characters in fixed wordlength mode. The observer is alerted to this by a beep presented through the earphone. In fixed code length mode, codes shorter than the C1C1 code length can be entered with 'BREAK'.

TIMED EVENT MODE. This mode is selected by responding to the CSCS prompt with a '00'. After the header, the observer enters the event codes and the MORE automatically records the elapsed time between events. If the coding scheme is exhaustive and the events are mutually exclusive, the elapsed time is the duration of each event. The left display shows the last 4 characters of the current event code and the right display shows the time from the start of the event. Times are clocked from the first keystroke of a code to the first keystroke the next code. In manual entry mode (C1C1=0) the manual 'BREAK' does not drop the clock when it is pressed; it alerts the MORE that the next data key will be the start of a new event at which time the clock will be dropped. Thus the clocking of elapsed time is consistant in both manual and automatic entry modes. Long duration events are recorded by dropping the time field into memory each time the clock rolls over (99 sec). Program ODIN adds successive time fields. Therefore elapsed times of any length can be recorded. The error key ('ERROR') erases all the characters since

the last time field (auto or manual). If the 'ERROR' occurs right after a time field, program ODIN will delete the previous code and add its duration to the following code. The following example illustrates some of these features. The coder keys in event 123, 6 seconds later the keys 33 and 'ERROR' are pressed followed by event 456, 120 seconds later 789 is entered, 15 seconds later 013 is entered followed by a 2 second pause and 'ERROR' 012, and 8 seconds later the trial is ended with 'FINISH'. This portion of data in the MORE would look like:

123b0633E456b99b20789b15013b02E012b08F

which ODIN would convert to the following:

```
      123   6     0
      456 120     6
      789  15   126
      012  10   141
 -1
```

There is no cumulative loss due to rounding off the time. If an event actually lasts 14.65 seconds, the MORE gives it a time of 14 and adds the .65 to the next event. In the MORE each b is followed by 2 digits of time. Program ODIN marks the end of trial ('F') with a '-1'. This format, with the events in a 10 column field, the duration in a 4 column field, and the elapsed time from the start of the trial to the start of each event in a 6 column field, is assumed by the other programs in the software package.

ELAPSED CLOCK MODE. This mode is similar to timed event mode except the clock is not reset at each event, it instead keeps clocking the elapsed time from the first data entry of the trial. Elapsed clock mode uses more memory as its time fields are 5 characters long (b and 4 time digits) as opposed to 3 characters in timed event mode. Data output by program ODIN would be identical if the same events were recorded in timed event or elapsed clock mode. The elapsed time from the start of the trial as shown on the right display is a useful marker for integrating field notes with the MORE's data. The two least significant digits of time are automatically shown on the right display. The two most significant time digits can be displayed by pressing 'CODE'. 'CODE' works as a toggle, each time it is pressed the two digits of time not being displayed are selected for display until 'CODE' is pressed again. (MOREs with version numbers less than 69 either 1) display the middle 2 digits of time and 'CODE' has no effect or 2) display the 2 least significant digits of time with 'CODE' causing the 2 most significant digits to

be displayed for 1 second.) In this situation 'CODE' doesn't drop any characters into memory. editing data in the MORE is easier with the elapse clock time fields which indicate how far into the trial each event is. The same sample sequences of events used above to illustrate timed event mode would be stored in the MORE as follows if recorded in Elapsed Clock mode:

123b000633E456b0126789b0141013b0143E012b0151F.

Notice that the time an event starts preceeds the event in the MORE's memory. ODIN outputs this sequence exactly as shown in the Timed Event example above.

EPOCH MODE. In this mode the observer chooses an epoch size ranging from 1 to 99 time intervals (usually seconds) and enters this choice in response to the CSCS prompt. The MORE clocks a continuous sequence of epochs of this size and stores the data entered in each epoch. The observer is alerted to the end of each epoch by a display change and a click through the earphone. The left display shows the last 4 characters of the current event and the right display shows the number of seconds elapsed in the current epoch. The MORE drops the data into memory as they are keyed in and drops 'd's as epoch delimiters whenever the epoch clock times out. The clock then resets to 0 and starts clocking the next epoch.

An example of epoch mode data is the event sequence 3, 43, 1, 'ERROR', and 22 occurring in the 1st epoch, 45, 22, 45, and 4 in the 2nd, and 33, 22, 'ERROR' in the 3rd and nothing in the 4th. The MORE would store this as:

d3b43b1E22bd45b22b45b4bd33b22bEdd

which program ODIN would output as:

3	1	1
43	1	1
22	1	1
45	2	2
22	1	2
4	1	2
33	1	3
9999	1	4

In the MORE, a 'b' marks the behavior and a 'd' the end of each epoch. A 'd' may fall between characters in an event code with no problem. ODIN will record an event

straddling the epoch barrier in the epoch in which it started. There are many ways of converting the character stream as stored in the MORE to an output form. ODIN may have to be modified to handle the data the way a given researcher wants it. The character sequence as stored by the MORE and input to program ODIN contains all the information needed to summarize the data in any of the standard ways. The default method chosen for ODIN is to list out the events in the epochs in which they were coded. If no event was coded in a given epoch, the special code '9999' is output for that epoch. ODIN uses the standard 10, 4, and 6 column output fields. The event code is in the first field. The second field contains the number of times the code occured in the epoch. The third field contains the epoch number.

Epoch mode is also useful for point sampling. The coder enters the time between samples as the epoch size and starts the trial. After entering the first event to get the clock started, the coder enters the event occurring each time the epoch times out (signaled by a click from the earphone).

EXTENDED EPOCH MODE (EE). This mode provides two different clock phases per epoch. The first and second phases are reffered to as E1 and E2 respectfully. The lengths of the two phases are selected separately and need not be equal to each other. There are two common uses of two phase epochs. In one codeing strategy, the observer uses E1 as a timeout period during which the next subject is found. E2 is used as the sample period during which the events of interest are observed and simultaneously entered into the MORE. In the other coding strategy, the observer watches the behavior stream during E1 and enters a summary of the preceeding E1 during the E2 period. EE mode is available in MOREs with version numbers 74 and greater.

To select the EXTENDED EPOCH mode, respond to the CSCS prompt with 'EE'. Respond to CLCL with the selected code length and to SCSC with the number of completed sample periods (E2) per trial. Two new prompts will then appear. E1E1 prompts for the length of E1, and E2E2 for the length of E2. If E1 is set at zero (00) each sample period (E2) is started by pressing the 'DATA' button. E2 must always be greater than 0. If E1 is greater than 0 the MORE will clock a stream of E1-E2 pairs. E1 is indicated by a series of clicks (every .1 sec.) presented through the earphone and by the right display counting down from the E1 value to zero. E2 is indicated by no extra sound on the earphone and the right display counting up from zero to the E2 time. Data can be entered in either E1 or E2

but the standard is to enter data only during E2. Each time E2 clocks out, a click is presented and a 'd' is dropped into memory to indicate the end of that sample period. The end of E1 is not marked in memory so data entered during E1 can not be discriminated from data entered in E2. The 'DATA' button can be pressed during either E1 or E2 to restart that E1-E2 pair at the beginning of E1. Any data already in that E1-E2 pair will be kept and can not be distingished from subsequent data entered in the restarted cycle.

Program ODIN will output EXTENDED EPOCH data in the same format EPOCH MODE data are output. The ERROR button and latch switches work as described in the EPOCH MODE section of the MORE manual. If an ODIN control file is used the labeles 'E1' and 'E2' should be used for the first two observer entered fields in the header.

CLOCK DISABLED MODE. This mode is entered by responding to the CSCS prompt with 'Cd' (press 'CODE', 'DATA'). The MORE provides no time base; it merely records the sequence of data keys pressed. Spaces and carriage returns may be entered by the 'ADV' and 'BREAK' keys respectively. The number of characters entered on the current line (since the last 'BREAK') is shown on the right display. The left display shows the last four characters entered. When long lines are entered the display will go blank every 10th character. This does not affect the data stored and program ODIN will output up to 80 characters per line.

Clock disable mode is used to convert any digital data to machine readable form. Thus many researchers use the MORE as a portable "keypunch". This mode is also used in recording from video tape when the time base is taken from the tape and manually entered along with each event. For example, if events 11, 22, and 33 occurred at frames 112, 243, and 324 respectively, the coder could enter 11a112b22a243b33a324b, which program ODIN would output as:

```
11 112
22 243
33 324
```

A user supplied program on the host computer could then calculate the elapsed times from the frame information and output the data in the standard format allowing further analysis by other ODAP programs. Program ODIN could also be modified to do the time calculation directly.

EXTERNAL TIME BASE MODE (EB). The MORE data logger has the capability of writing a time base on an audio track of video or audio tape. The observer can then code events recorded on other channels of the tape and the MORE will automatically recover the time each event occurred form the time base audio track. The tape can be stopped, repositioned, and restarted during coding and the times will still be correct as the time is physically part of each tape segment. Multipal passes can also be made with assurance that the times will be in perfect synchrony across passes. If the tape can be coded in a single pass, use one of the MORE's internal clocking modes and code as thought observing in real time. If on the other hand the coding scheme requires stopping, repositioning, and restarting the tape, the External time Base (EB) can result in enormous time savings and more accurate data. This mode is available in MOREs with version numbers 74 and greater.

WRITING THE TIME BASE

The MORE writes the time base on an audio track. No other information can be on the time base track. Thus you must have an audio track to dedicate to this function. Audio tapes must have at least two tracks, one for the events being coded, and one for the time base. Video tapes must have at least two audio tracks if the audio portion of the recording session is used in the coding scheme. If no audio information from the recording session is needed than a video tape with only one audio track can be used. The time base can be written on the tape during the recording session, or after the recording session if the recording equipment allows dubbing.

To write the time base:

1) Connect the MORE's audio out port to the input port of the audio track selected for the time base. MAKE SURE THAT THIS TRACK HAS NO IMPORTANT INFORMATION ON IT AS IT WILL BE OVER WRITTEN AND DESTROYED BY THE TIME BASE.

2) Turn the MORE on and preform a hard reset ('red' down, 'RESET', 'CLEAR'.

3) Select write time base mode by having the red button down and pressing 'CTRL' (yellow) followed by 'EB' ('DEFSG' on older units). The left four digits on the display should be 'CCCC' at this point. 'CCCC' is the prompt for the Clock units.

4) Respond to 'CCCC' by entering the desired clock units selected from the following

Respond with	to select this tim
00	.01 sec
01	.02 sec
02	.5 sec
03	1.0 sec
04	2.0 sec
05	5.0 sec

If no responce is made to 'CCCC' the clock units will defalt to 1.0 seconds per clock tick.

5) Start the tape and press 'ADV' when you want the MORE to start writing the time base. Every .1 seconds the MORE will write the current cumulative time on the audio track. This can be monitored on the recorders VU meter. The time base starts with 0000 when the 'ADV' is pressed and is incremented by 1 each time the selected clock unit times out.

6) At the end of the recording session, press 'RESET' and let the RED up. You may now turn the MORE off or do any of the other MORE functions. The time base is now an integral part of the observation on the tape and will be there until the tape is erased or until something else is recorded on that track.

COLLECTING DATA USING EXTERNAL TIME BASE (EB) MODE

To record data with the time base taken form an audio track of a tape written as described above:

1) Connect the recorder output of the time base track into the MORE's audio input port.

2) Enter the header into the MORE in the manner described in the MORE manual. Respond to the coding scheme prompt (CSCS) with 'EB' for External time Base.

3) Press 'DATA' and turn on the tape and the MORE will start reading the time base. The right display will show the two least significant digits of the time field track. Time fields are four digits long. To see the two most significant digits of time press 'CODE' and they will be shown on the right display. 'CODE' works as a toggle, each time it is pressed the two digits of time not currently displayed are selected for display until 'CODE' is pressed again. Data entry is not effected by the portion time field displayed. The time will be contunously updated as new times are read form the tape. When an event is entered from the keyboard the current time (the one read just before the first keystroke of the event) will be stored in the MORE's memory with that event.

The first keystroke of each event has to be held down slightly longer than other keystrokes as the MORE only checks for keystrokes when its not decoding the time information. Once the first keystroke of an event is recognized, the MORE scans the keyboard until the complete event description is entered. The clock is not updated again until after the complete event is entered. The completion of an event description is definded by entering a complete code length ('CLCL') or by pressing the 'BREAK'. Listening to an earphone plugged into the MORE's audio output port allows the coding to go smoothly. The earphone presents a tone while the MORE is listening to the time base. As soon as the first keystroke of an event is recognized the tone stops and stays off until the complete event descriptor is entered.

The tape can be stopped, repositioned, and restarted as often as necessary. For the MORE to read the time, the tape must be played back at the same speed as it was going when the time base was written. Other tape speeds can be used to find and study the events of interest. Then change to the time base speed while coding those events.

THE LATCH SWITCHES CAN NOT BE USED DURING 'EB' CODING SESSIONS.

4) Finish the trial by pressing 'FINISH'. The 'FINISH' and 'ERROR' keys are treated as any other key and must be held down until recognized. The trial length is det`rmined by the time associated with the 'FINISH' press. The tape should therefore be positioned to the end of trial and be running at the time base speed when 'FINISH' is pressed.

5) Data collected in EB mode can be treated as any other MORE data. They can be stored on cassette tape, dumped to the host computer, edited, or other trials can be coded.

ODIN AND EB DATA

ODIN outputs EB data sorted by the start times stored with each event. The standard ODIN format is used with the events in the first column, the interevent interval in the second column, and the start times in the third column. The interevent interval is calculated by subtracting the start time of each event from the start time of the next event in the sorted set.

The event codes and start times for each trial are stored in the arrays CODES and CTYMS for sorting before being output. These arrays are dimensioned at 500. The dimensions must be changed if there are more than 500

codes in any single trial.

Trial lengths should be less than 9999 time units as the MORE stores 4 digits of time. If the time units are seconds, trials can be over 2 1/2 hours (166 min), while if the time units are .1 seconds the trials should be 15 minutes or less (16.6 minutes).

LATCH SWITCHES. The latch switches can be used in Timed Event , Elapsed Clock, Extended Epoch, or Epoch mode. After each complete event is entered on the keyboard (after an auto or manual 'b'), the 8 latch switches are continuously scanned for any change of state. When a change is detected a 'C', which marks all latch switch enteries, is dropped into memory followed by the switch number (1-8) and a 'b'. In Timed Event and Elapsed Clock modes a time field is also dropped into memory. Keyboard enteries can be interspersed with latch switch enteries, but the switches are not scanned between the 1st and last keystroke of a keyboard event code. For example, if the MORE is in a 3 digit code length and the coder starts a code with a '1' turns switch 2 on and off and finishes the event with a '23', the onset and offset of switch 2 will not be stored in MORE's memory. If however, the coder enters a '1' then turns switch 2 on and switch 4 off and then finishes the keyboard entery with a '23', the MORE will detect and store both the switch changes, but it will do this after the '23' was entered.

All switches must be off at the start of a trial and a keyboard event must be entered before any latch switch enteries are made. Onset and offset is determined by the sequence of enteries for each switch. The 1st is an onset, the 2nd an offset, the 3rd an onset, the 4th an offset, etc.

All information needed by ODIN to reformat the data in a variety of ways is stored in the MORE and transmitted to the host computer. The following event sequence will be used to illustrate how the data are stored in memory and how ODIN reformats these data. No switches are on, event 11 is entered, 3 seconds later switch 1 is turned on, 10 seconds later switch 3 is turned on, 8 seconds later event 44 is entered, 7 seconds later switch 5 is turned on, 4 seconds later switch 3 is turned off, 6 seconds later switch 5 is turned off, 8 seconds later switch 3 is turned on, 5 seconds later switch 3 is turned off, 6 seconds later switch 1 is turned off and 7 seconds later 'FINISH' is pressed.

In Timed Event mode the above sequence would be stored in the MORE as:

11b03C1b10C3b0844b07C5b04C3b06C5b08C3b05C3b06C1b07F

which Odin would convert to:

```
 11  21   0
  3  19  13
  5  10  28
  3   5  46
  1  54   3
 44  43  21
-1
```

ODIN outputs the latch switches in the order they were turned off, not by their onsets. The output lists the code or switch label in the first column, the duration in the second, and the start time in the third. Durations of latches are clocked seperately for each switch. The duration of a keyboard event is clocked to the next keyboard event. That is, the duration of a keyboard event is not ended by latch switch changes. In Timed Event mode the MORE resets the clock at each event or switch change, but ODIN adds these back togeather to get the durations.

In Epoch mode with 10 seconds epochs, the above sequence would be stored in the MORE's memory as:

11bC1bdC3bd44bC5bdC3bC5bdC3bdC3bC1bdF

which ODIN sould convert to:

```
 11  1  1
  1  1  1
  1  1  2
  3  1  2
 44  1  3
  1  1  3
  3  1  3
  5  1  3
  3  1  4
  5  1  4
  1  1  4
  1  1  5
  3  1  5
  3  1  6
  1  1  6
-1
```

In Epoch mode the latch value is entered in each epoch during which its switch was on. Keyboard enteries are only listed in the epochs their first character was

entered in. Note that within an epoch, switches are not always output in the order in which they were turned on.

VARIABLE TIME BASE. The MORE's default time unit is 1 second, however for those who require a different time base, any one of the following can be chosen.

00	.1sec
01	.2sec
02	.5sec
03	1.0sec
04	2.0sec
05	5.0sec
06	10.0sec
07	20.0sec

The time base is changed by responding to the CSCS prompt with an 'ADV'. The MORE will then show CCCC (mnemonic for clock) and you respond with the selected time base (i.e. 00 for .1 second) After pressing 'ADV' the MORE will return to the CSCS prompt, and proceed with the 3 mandatory header fields. Assume you wish to code in EPOCH MODE, where each epoch is .7 seconds. The header is as follows:

CSCS	'ADV'	activate variable time base
CCCC	00'ADV'	choose .1sec intervals
CSCS	07'ADV'	epoch size is 7 time intervals
CLCL	xx'ADV'	enter the number of codes per line
SCSC	xx'ADV'	enter session clock in minutes

CHAPTER 5

VIEWING AND EDITING DATA

Viewing and editing data requires a very basic understanding of how data are stored in the MORE. Each character 0-9 and A-F is stored sequentially in memory as they are pressed (i.e. 12b2234b04F). In addition the MORE drops time fields into memory in timed event and elapsed clock modes and 'd's as epoch delimiters in epoch mode. Timed Event mode time fields follow the event they are associated with and consist of a 'b' and a two character duration in the time interval selected (default is seconds). Durations of long codes (greater than 99 units) are recorded with consecutive time fields. In elapsed clock mode the time field consists of a 'b' followed by a four character elapsed time from the start of the 1st code in the trial to the start of the next event listed in the MORE's memory. In epoch mode the epoch delimiter ('d') is dropped into memory each time the epoch clock resets to 00.

DATA PROTECT MODE. To protect against accidentally altering the data, all editing and viewing functions are disabled with the RED key in the up position. The RED key must be down to activate all functions described in this chapter, except dropping breakpoints ('DP-BP') which is a coding function.

YELLOW FUNCTIONS. To preform any of the functions written in yellow on the keyboard ('BKWD', '1 BP', 'LOAD', 'NX-BP'), first press the yellow key ('CTRL') and then the desired function key.

POSITIONING. Displaying portions of the session for checking and editing is facillitated by a system of breakpoints. Breakpoints are pointers which allow immediate positioning to selected memory locations. The beginning and end of each header ('C' and 'd') are automatically marked with breakpoints. In addition, the

coder can mark any portion of the pretrial or trial by pressing the 'DP-BP' key. The 'DP-BP' key works with RED up or down so it may be used during trials. To view data using the breakpoints the '1 BP' key positions you at the first breakpoint (beginning of memory where the MORE id is stored followed by the data) and the 'NX-BP' key steps sequentially through them. If you attempt to step beyond the end of data EEEE is displayed. The jump functions, 'FWD' for forward and 'BKWD' for backward, allow you to move sequentially through the data two characters at a time. Letting the Red key up positions the pointer at the end of data, thus to jump to the end of data, let 'RED' up and lock it back down to continue editing from the end of data. The '1 BP', 'NX-BP', 'FWD', and 'BKWD' keys can be used in any order or combination to position oneself at the desired portion of the data. 'NX-BP' moves to the next address in the breakpoint list, regardless of the current position in memory. The editing functions for inserting and overlaying characters discussed below may be freely intermixed with the positioning functions. Inserting does, however, result in all breakpoints located beyond the insertion spot being off by the number of characters inserted. Up to 32 breakpoints may be used.

EDITING. Inserting and overlaying data is done two characters at a time. This is sometimes a little cumbersome for editing and will require some practice. To overlay two characters, position them in the right half of the left display, roll them just off the right of the display with the 'BKWD' and key in the two desired characters. You must key in both characters of a word even if you only want to change one of them. Fields which are any multiple of 2 characters can be overlayed in this fashion. Thus six consecutive characters can be rolled off the right of the display with 'BKWD','BKWD', 'BKWD' and six new ones keyed in to replace them. If two characters are to be changed but they straddle a word boundary (i.e. they cannot be positioned as the next two characters off the display) all four characters in the two words must be overlayed.

Deleting characters is accomplished by overlaying each character to be deleted with an 'A'(ADV). Program ODIN ignores 'A's in the data portion of the trial and converts consecutive 'A's in the header to a single space.

Sometimes additional space must be made for inserting totally new characters instead of overlaying existing characters. The 'INSRT' key moves all characters which lie beyond the left pair in the display two positions to

the right and fills the gap with AA. The AA can then be rolled off to the right with a 'BKWD' and the additional characters can be keyed in to overlay the AA. Consecutive 'INSRT's can be pressed for inserting more than two characters.

CHAPTER 6

TRANSFERRING DATA

Each coding session must end by transferring the data to either the host computer or a cassette tape. All data in the MORE are erased when the MORE is turned off.

Data transfer requires properly connecting the MORE to the external device. For dumps to the host computer, this entails connecting the MORE's 9 pin port to the host computer and terminal via the threeway cable provided. Loads from cassette and verification of dumps require a connection between the remote output of the recorder (ear or monitor port) and the MORE's audio input port. In dumping to cassette connect the MORE's audio output port to the recorder's auxilary input or line in. If the cassette doesn't have an auxilary port use the microphone input.

DUMPING TO EXTERNAL DEVICES. Dumping data is done with the 'DUMP' key. After pressing the 'DUMP' key bdbd will be shown on the display. This a request for the baud rate. If you are dumping to the host, the rates are:

00'ADV' 110
01'ADV' 300
02'ADV' 1200
03'ADV' 9600

PARITY. If the first digit in the response to bdbd is a 0 as in the above table, the MORE sill transmit with no parity. This is standard at many computer installations. If the 1st digit is a 1 or 2 the MORE will transmit odd or even parity respectively. For example, to transmit at 300 baud, even parity, enter 21'ADV' in responce to bdbd.

If you are dumping to the cassette, the rates are:

00'ADV' 300
01'ADV' 600

02'ADV' 1800

After selecting the baud rate, OdOd will be shown on the display. This is a request for output device selection. Select the desired device with one of the following responses:

OdOd	Device
01'ADV'	cassette
02'ADV'	Host computer

DUMP TO CASSETTE. Connect the MORE's output to the recorder's input port, lock RED down, and press 'DUMP'. The left display will prompt for rate with bdbd. Respond by keying in 02'ADV' to select the fastest rate. The MORE will then prompt for output device with OdOd on the left display. After a 01'ADV' response to OdOd the MORE will request a cassette file id with the prompt CFCF. The id is stored with the data and insures proper identification of the file when reloaded. IDs can be any hexadecimal or decimal number except 00, FE, and FF. The dump starts with the 'ADV' which finalizes the CFCF response. Therefore key in the file ID and verify the desired ID is on the right display, then position tape to the desired spot, place the recorder in record mode and let it get up to speed before pressing the last 'ADV'. Multiple files can be dumped to the same tape. Leave space between files to ease positioning and keep a log of file ids, starting and ending footage, and contents. Verbal comments can be recorded on the tape just before each file using the recorders microphone. The plug connecting the MORE to the recorder's MIC or LINE IN port will have to be pulled out of the recorder while recording verbal comments. Each dump to cassette dumps all of the user data plus all of the breakpoints.

After dumping to cassette, the MORE will respond dddd meaning dump done. To verify that the dump was successful, connect the recorder's output port (ear or monitor) to the MORE's input port, rewind the tape, press 'ADV', and start the cassette. The MORE will then perform a non destructive verification of data on the tape. A correct verification will return dddd. This assures you that the data can be loaded with no errors later. If an error is detected, the display will show EEEE and you should redump the data. If the display stays blank, the MORE could not read the file ID. Check all connections and make sure the volume control is turned most of the way up and that the tone (if there is one) is at full treble

(all the way up). Then try the dump again. Most researchers dump at the highest rate with no problems.

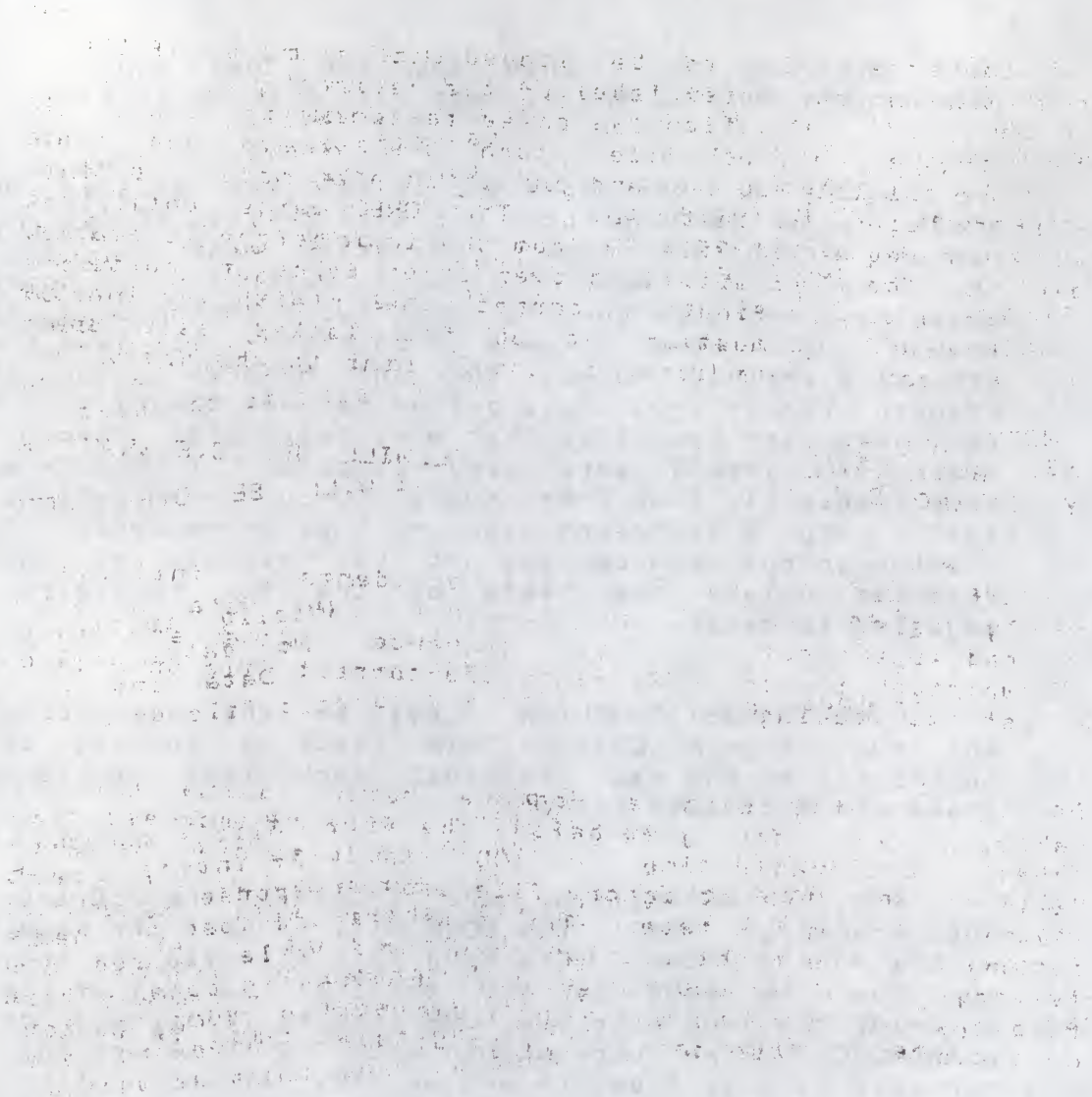
CASSETTES. The tapes should be good quality music grade cassettes 30 minutes per side or less (C-60). Only use one side of the tape. Cassettes made for digital recording (i.e. Wang, Olivetti calculator or computer cassettes) and high quality music tapes (chromium dioxide) should not be used. Brands of cassettes that have proven effective include: Maxell, TDK, and Memorex. For these brands, choose C-60 tapes priced between $2 and $3. Many recorders list cassettes that work best with them. The audio I/O should work very reliably. If "EEEE"s occur more frequently than once every 20-30 verifications or loads, try a different brand of tape or recorder. Tapes written on one recorder may not be readable on another recorder unless the heads of the two recorders are adjusted to match.

DUMP TO HOST COMPUTER. Login to the host computer and run program ODIN. ODIN lists a summary of the procedures on the user terminal each time it is run. These are discussed below.

After selecting dump mode by locking the RED key down and pressing 'DUMP', the MORE will request the baud rate with the bdbd prompt. The baud rate selected for the MORE must be the same as the terminal is set at. After entering the baud rate the MORE prompts for output device with OdOd. The user should enter 02 to select the host computer as output device and an 'ADV' at which time the display will go blank. Program ODIN controls the dump by sending a $ each time it wants the next record to be transmitted by the MORE, or ODIN will send an * if it has detected a transmission error and wants the MORE to retransmit the last record.

DUMP DONE. Upon completion of a dump the MORE is in the same status as before the dump started. The same data can be dumped again, edited, or additional trials may be appended. If a completely new set of data is to be recorded, and the old data in the MORE overlayed with the new data; lock the RED key down, 'RESET', 'CLEAR', and let RED up.

LOADING FROM CASSETTE. Connect the MORE's input port to the recorder's output port. Loading is initiated by pressing the 'LOAD' key. The MORE then asks for the id of



the cassette file to be loaded with a prompt of CFCF. Enter the two character label of the desired file followed by an 'ADV'. Position the cassette somewhere before the start of the desired file, turn the volume and tone controls all the way up, and put it in play mode. Do this after pressing the last 'ADV'. The MORE waits until it reads the requested file ID from the tape before it starts loading. The MORE will skip over other files or portions of files until it finds the correct one. (With version 59 MOREs the RED key must be let up and locked back down between loading form cassette and dumpint to the host)

NOTE: ALL DATA PRESENTLY IN THE MORE WILL BE OVERWRITTEN BY LOADING DATA

If a 'LOAD' or 'DUMP' is accidentally initiated, merely press 'RESET' and continue. No data will be altered as a result of this sequence. Data are only overwritten if the MORE finds the correct file on a tape and starts loading.

A cassette with a footage meter allows you to position the tape just before the file of interest thus saving considerable time. A 'OO' in response to CFCF directs the MORE to ignore file labels and load the next valid file from the tape. The id of the file loaded is returned on the right display when the load is done. This is very helpful if you forget the Id used in dumping the file. Loading in no way alters the tape. Therefore data once stored on tape can be loaded as many times as wanted.